A STUDY ON CLINICAL PROFILE AND OUTCOME OF RENAL DUPLICATION IN CHILDREN

Dissertation submitted to

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

in partial fulfilment of the requirements

for the award of the degree of

M.Ch. BRANCH – V

PEDIATRIC SURGERY

THE TAMILNADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI

AUGUST - 2013

DECLARATION

I solemnly declare that this dissertation titled "**A Study on Clinical profile and outcome of Renal Duplication in Children**" was prepared by me in the Department of Paediatric Surgery, Institute of child health and hospital for Children, Egmore, Chennai under the guidance and supervision of Prof.S.V.Senthilnathan M.Ch., Professor & Head of the department, Department of Paediatric surgery, ICH, Chennai. This dissertation is submitted to The Tamilnadu Dr.M.G.R Medical University, Chennai in partial fulfilment of the university requirements for the award of the degree of M.Ch. Paediatric surgery

Place: Chennai

Date: Dr.T.Jeevarathy

CERTIFICATE

This is to certify that the dissertation entitled "**A Study on Clinical profile and Outcome of Renal Duplication in Children**" is a bonafide work done by **Dr.T.Jeevarathy** under my guidance and supervision during the period between 2010 – 2013 towards the partial fulfilment of requirement for the award of M.Ch Branch V (Paediatric Surgery) degree examination to be held in August 2013 by the Tamilnadu Dr. M.G.R. Medical University, Chennai.

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INTRODUCTION

INTRODUCTION

Renal duplication is the commonest and most significant anomaly in pediatric urology.[1] . Incidence in the general population is 0.8 %[2]. Wide variety of clinical manifestations will occur due to reflux, obstruction by ureterocele and ectopic ureteric orifice. Appropriate management needs assessment of the anatomy of the renal system, understanding the source of morbidity and demonstrating functional renal moiety[3] .

Commonly upper pole of the duplex system is associated with ureteral ectopia and ureterocele. Lower pole of the duplex system is associated with vesico-ureteric reflux and Pelvi-ureteric junction obstruction[4]. Surgical options include primary bladder surgery and primary upper urinarytract surgery. Primary bladder surgery includes transurethral incision of ureterocele, common sheath Ureteric reimplantation. Upper tract surgery includes heminephrectomy for non functioning moiety, uretero-ureterostomy and ureteropyelostomy for the affected moiety with adequate function.

The purpose of this study is to find out the various manifestations of the renal duplication, its surgical management and its outcome.

AIMS AND OBJECTIVES

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The primary aim is to study the Incidence, types of Renal Duplication and the outcome of surgical management individualized for each patient.

The secondary objectives are to analyse the value of imaging (USG, Excretory urography, Nuclear scan) in the management of Renal Duplications.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Urologic section of American Academy of Pediatric Committee on Nomenclature and Classification defined duplex kidney as kidney with two pelvicalyceal systems, the upper and lower poles. Complete duplication means two ureters draining separately into the bladder or below the bladder neck. In incomplete duplication, two ureters fuse into one unit, proximal to the bladder and then drain into the bladder through a single orifice. Incomplete duplication is more common but usually asymptomatic.

Complete duplications are rare in incidence but expresses with significant clinical features. Complete duplications are usually associated with higher grades of reflux and renal dysplasia with poor function of the affected moiety. Rare type of ureteric duplications includes inverted Y-type in which single pelvis and proximal ureter with distal double ureters draining separately into the bladder. Blind ending duplication is another rare type in which one limb of bifid ureter does not drain a portion of the renal parenchyma. Bifid pelvis is another type of incomplete duplication that contains single ureter distally with two renal pelvis.

INCIDENCE :

Familial occurrence is about 12.5 to 30 %[5, 6, and 7]. Incidence of complete duplication is less than 0.1 % with female preponderance.

EMBRYOLOGY:

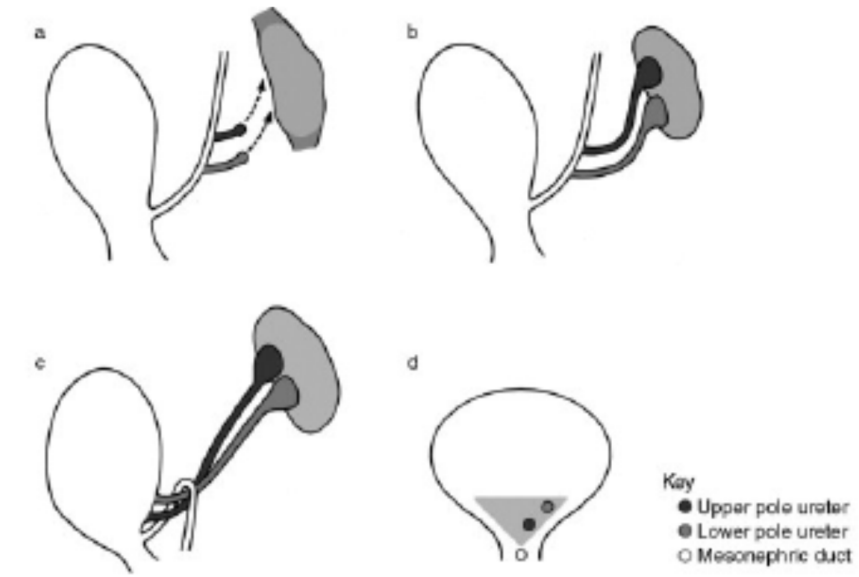
In the fourth week of gestation, ureteral bud originates from the ventral bend of mesonephric duct. Any abnormality of the ureteral bud here leads to ureteral duplication. In the fifth week of gestation, ureteral bud penetrates the metanephric blastema and branching of ureteric orifice is complete by about fourteen weeks. In the eighth week of gestation, portion of the mesonephric duct between the origin of ureteric bud and the cloaca which is called the common excretory duct, expands along with the short segment of mesonephric duct above the ureteric bud, and gets incorporated within the posterior aspect of urogenital sinus and forms the trigone of the bladder.

Initially, the ureteric orifice in the urogenital sinus is below and medial to the orifice of the mesonephric duct. With development, ureteral orifice migrates proximally and laterally. The orifice of the mesonephric duct moves caudally and medially. Because of this

migration, normally, the ureteric orifice occupies the superolateral angle of the bladder trigone.

If the bifurcation of ureteric bud occurs after its origin from the mesonephric duct, it results in incomplete duplication. If the division of the ureteric bud occurs after it penetrates the metanephric blastema, it results in bifid pelvis. If two ureteric orifices originates from mesonephric duct, it results in complete duplication. If the ureteric bud originates from the lower level of the mesonephric duct arriving early at the urogenital sinus permitting its migration cranially and laterally, VUR results due to lack of detrusor support.

If the ureteric bud originates in a higher level in the mesonephric duct, its incorporation into the urogenital sinus will be late which results in shorter, cranial and lateral migration leading to caudal and medially location of the ureteric orifice towards the bladder neck. If the ureteric bud originates in a significantly higher level in the mesonephric duct, it fails to get incorporated into the bladder which results in the ectopic ureter formation.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b
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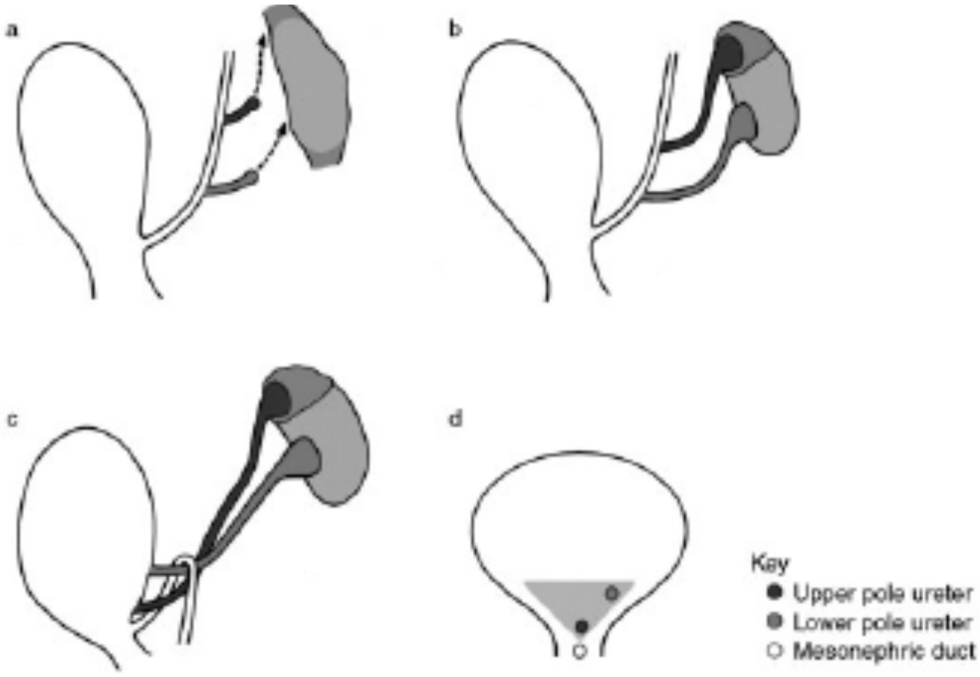
Key
Upper pole ureter
Lower pole ureter
Mesonephric duct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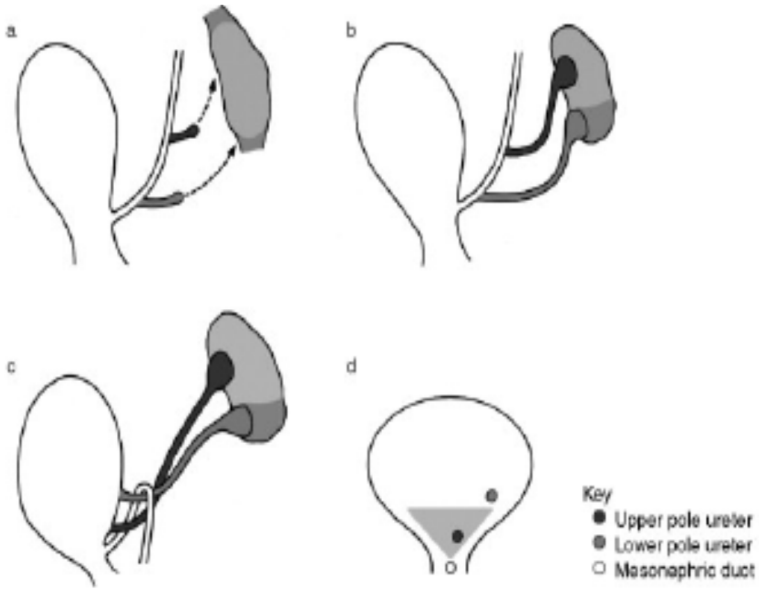
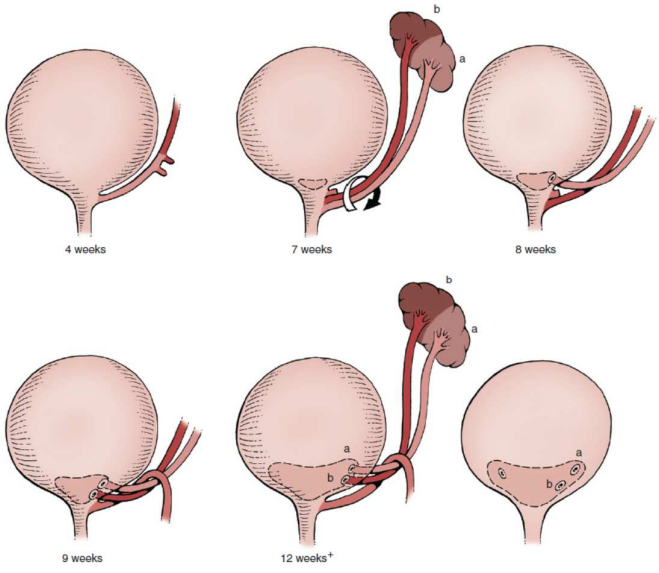


MEYER WEIGHERT LAW

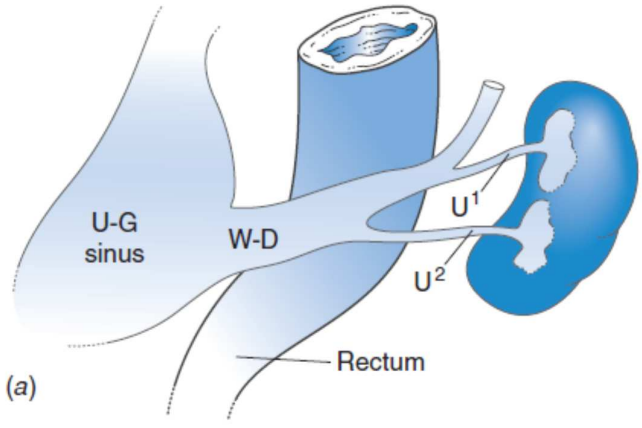


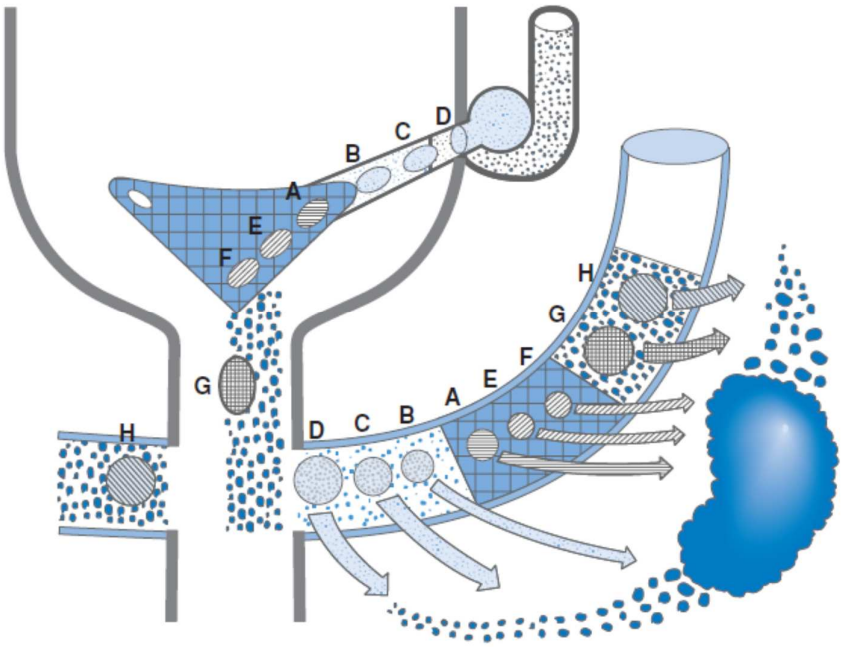
The upperpole ureter &lowerpole ureter rotate on their longaxis leading to upperpole orifice(b)medial&caudal location and lowerpole orifice(a) in lateral&cranial location.

This law describes the inverse relationship of the duplex ureteric orifices, in which the ureterocele or ectopic ureter associated with the upperpole is caudal to the lowerpole ureteral orifice.

MACKIE AND STEPHENS THEORY:

This theory proposes that positioning of the ureteric duct on the Wolfian duct corresponds to the final position of the ureteric orifice. Normally metanephreic blastema has variable potential for formation of renal tissue. Best potential exist in center of the blastema. On either side the potential for formation of normal tissue is decreased. If the ureteric bud originates above or below the normal point of origin, it induces abnormal renal tissue and increases the frequency of dysplasia/ hypoplasia.





MACKIE& STEPHENS THEORY: Ureteral bud position on the mesonephric duct corresponds to final position of ureteric orifice.

CLINICAL PRESENTATION:

Antenatal USG can detect ectopic ureter, Ureterocele and duplications. Common presentation is hydronephrosis.[8] .

Newborns present with bladder outlet obstruction due to prolapsed Ectopic ureterocele[9.].

Prolapsed ureterocele can present as interlabial mass

Urinary tract infection due to reflux or obstruction[10]

Flank pain, fever, abdomen mass is the common presentation of ectopic ureter[11]

Ureterocele causing obstruction or infection leading to irritative voiding symptoms

Epididymo-orchitis in ureteral ectopia into male genital tract

Urinary incontinence due to ectopic ureter opening beyond the external sphincter. Frequency and urgency in ectopic ureter due to trickling of urine into the posterior urethra[12].

Ectopic ureter into vagina causing continuous wetting along with normal micturation pattern in females.

INVESTIGATIONS:

Management of Duplex system kidney with Ureterocele or Ectopic ureter is based on a thorough assessment of the affected anatomy and the functional implications of the condition.

ULTRASONOGRAPHY:

USG can differentiate single and duplex systems of kidney. Varying degree of hydronephrosis of involved kidney depending on the severity of ureteral obstruction can be documented. USG always

includes the survey of bladder and it is the best mode of investigation to diagnose ureterocele which appears as thin walled cystic structure arising from posterolateral side of the bladder. Ectopic ureters displaces the posterior wall of bladder and mimics ureterocele and is termed as pseudoureterocele *(13)*

VOIDING CYSTOURETHROGRAPHY:

VCUG Can delineate Ureterocele&Reflux. Appearance of Ureterocele is Smooth broad-based filling defect near the trigone of the Bladder. Early Images during filling phase of the bladder better delineate ureterocele.

EXCRETORY UROGRAPHY:

It is an useful tool in accurate anatomical delineation of moieties &Ectopic ureters.*(14)*

Excretery urography finding of occult duplex kidney includes Drooping lilly sign, Missing calyx, Lateral displacement of lowerpole ureter.

RENAL SCINTIGRAPHY:

It helps to quantify functioning renal parenchyma which is important for salvage of renalmoiety. Functional assessment is important for initial management and for postoperative followup.

COMPUTER TOMOGRAPHY & MAGNETIC RESONANCE IMAGING::

It defines the Anatomy of Kidney with collecting system of bizarre appearance.MRI is more useful to to identify Occult Dysplastic Renalmoieties,Ectopic ureters& ureterocele, *(15,16).*

CYSTOSCOPY:

We can differentiate complete & incomplete duplications by seeing the number of orifice on each side of the bladder. We can document the location of ureteric orifices. Small intravesical ureterocele appears as cystic dilatation which expands with each peristalsis. Ectopic ureters cannot be seen in cystoscopy but hemitrigone of the bladder on the affected side is often underdeveloped and elevated from behind by dilated ectopic ureter.

MANAGEMENT:

Duplicated collecting system is one of complex upper urinary tract anomaly in which each patient require an individualized treatment. Asymptomatic uncomplicated ureteral duplication donot require any treatment. Mainstay of management depends on whether to save (or) discard involved kidney?, whether (or) not there is a need to reconstruct the bladder?

Goals of treatment includes preservation of functional renal parenchyma, elimination of infection, obstruction and reflux.

DUPLEX SYSTEM WITH ECTOPIC URETER – NONFUNCTIONING UPPERMOIETY:

Heminephrectomy with subtotal ureterectomy is recommended[17].

DUPLEX SYSTEM WITH ECTOPIC URETER-SALVAGEABLE FUNCTION:

Ureteropyelostomy (or) Ureteroureterostomy with excision of lower ureteral segment. Common sheath ureteral reimplantation for obstructed Ectopic system is another option.

DUPLEX SYSTEM WITH URETEROCELE – NONFUNCTIONING UPPERMOIETY:

Upperpole Heminephrectomy with subtotal Ureterectomy which will effectively decompress the Ureterocele. *(18,19).*

Some patients will require secondary procedure for persistent Reflux (or) Obstruction due to Ureterocele. *(20,21,22).* Combined approach includes heminephrectomy, Ureterocele excision,ureteral common sheath reimplantation in one stage will reduce the need for secondary surgeries. *(23).*But it is technically difficult in small children. According to Husmann et al need for additional surgery depends upon the number of Renalmoieties that originally had VUR. *(24).* Ureterocele alone doesn't require further surgery. But Ureterocele associated with highgrade reflux (or) Reflux in to both moieties,Ureterocele involving other renal segments, prolapsing Ureterocele will need secondary procedures.refluxing ureterocele need combined upper and-lower tract approach. *(25,26).*In newborns and small infants Unroofing of Ureterocele followed by definitive reconstructive surgery should be done in later stage if reflux persist.

DUPLEX SYSTEM WITH URETEROCELE-FUNCTIONING UPPERMOIETY:

Uppermoiety salvage surgery includes Ureteropyelostomy and Ureteroureterostomy with subtotal ureterectomy. But it is not advisable for Ureterocele associated with VUR. Uppermoiety Heminephrectomy is recommended by some clinicians to avoid potential complications of reconstruction,longterm complication of dysplastic uppermoiety retention.If Ureterocele is associated with VUR primary Bladder surgery includes removing the ureterocele and correcting the reflux is recommended.

FOLLOWUP:

Six weeks after surgery USG (or) functional studies have been done for assessing status of salvaged uppermoiety and remaining lowermoiety. VCUG has to be done 3-6 months after bladder reconstruction to assess apprearence of new reflux.

MATERIALS AND METHODS

MATERIALS AND METHODS

STUDY POPULATION:

All patients with double moiety kidney based on antenatal scan, clinical symptoms, and proved by investigations were included.

NATUREOF STUDY: Prospective study/ descriptive study

NO. OF CASES: 40

STUDY PERIOD: September 2010 To January 2013

INCLUSION CRITERIA:

All children with image documented double moiety ,treated as inpatient in dept of Pediatrics surgery at ICH, Egmore were included.

EXCLUSION CRITERIA:

Renal duplication associated with lower urinary tract duplication, Single moiety ureterocele ,Horse shoe kidney with double moiety were excluded.

METHODOLOGY

All antenatally diagnosed hydrnephrosis cases, children who presented with urinary symptoms like pyuria, difficulty in micturition, febrile UTI and urinary dribbling were admitted. The patients were subjected to detailed clinical examination and relevant investigatons were performed,namely,ultrasound examination, MCU, IVU, Scopy, renogram. Proven cases with double moiety were included in the study.

INVESTIGATION PROTOCOL:

Renal and bladder ultrasound were done initially. All cases with hydronephrosis were further evaluated with VCUG & Excretery Renogram. These modalities of investigations would identify double moiety in almost all cases. The upper moiety functioning was assessed by radio nucleotide scan. MR urogram was done for selected cases which had dribbling urine and disproportionally dilated ureter with normal cystoscopic findings. Cystoscopy was done for all cases to identify the number of orifices in the affected side which helps to differentiate complete from incomplete duplication.

TREATMENT MODALITIES:

Child less than one year was treated with cystoscopic deroofing of ureterocele done for ureterocele associated with double moiety and followed-up with chemoprophylaxis. Non-functioning upper moiety cases were treated with upper pole heminephrectomy. Postoperative cases were followed up with USG every 3 months, VCUG and DTPSA scan.

OBSERVATION AND RESULTS

OBSERVATIONS AND RESULTS

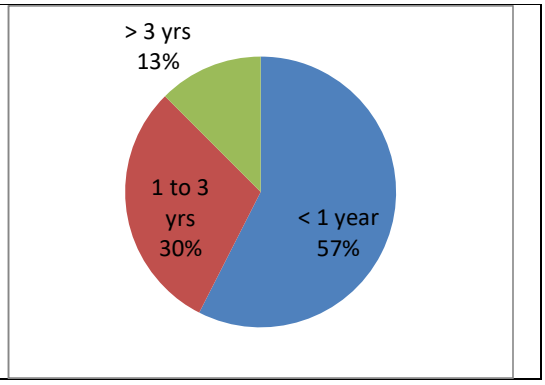
The study comprised of 40 patients who were admitted and evaluated for Renal Duplication from September 2010 to January 2013. These 40 patients satisfied the inclusion and exclusion criteria.

BASELINE CHARACTERISTICS:

Age and gender statistics:

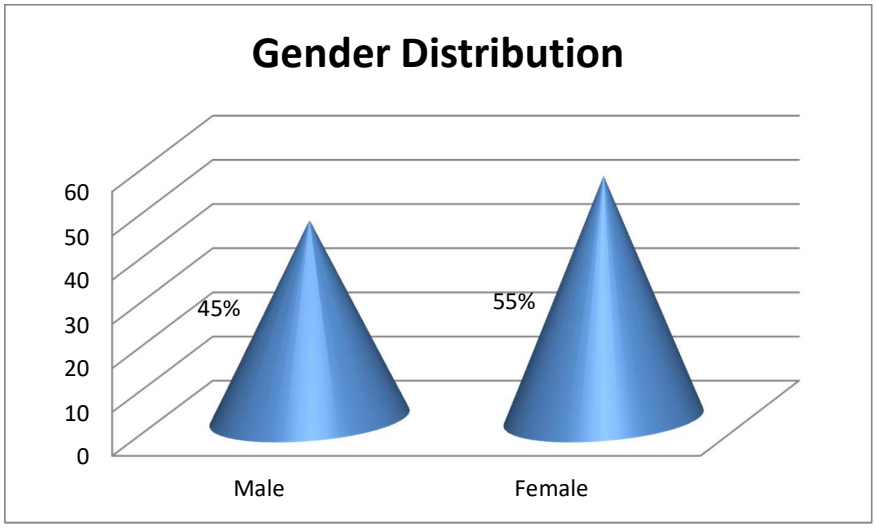
In our study, Renal duplication was present commonly in infants with 23 (57.5%) out of 40 patients presenting less than 1 year

Age	N = 40
Upto to 1 year	23
1 to 3 years	12
More than 3 years	5



Gender predilection:

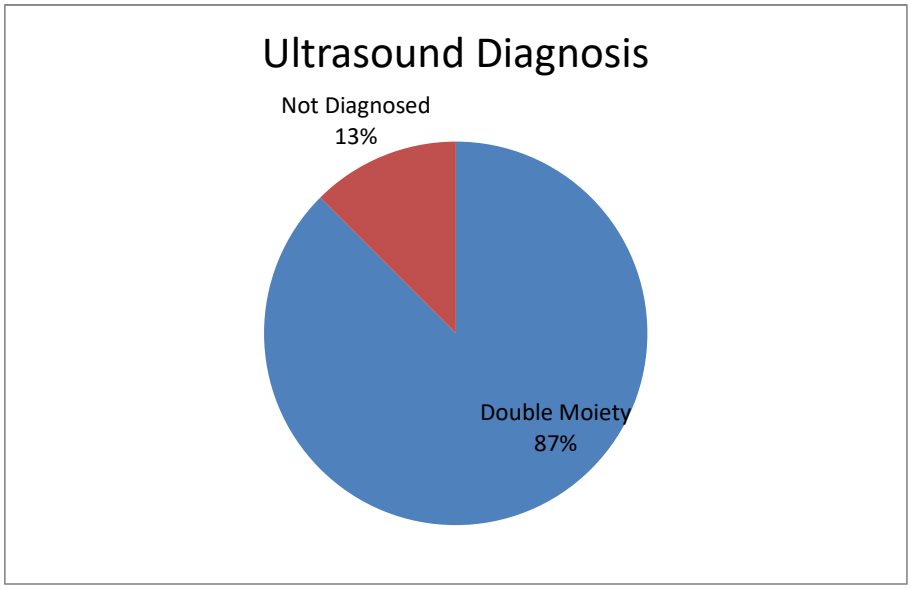
In this study renal duplication was more frequent in female children (22 patients) than in males (18 patients) in the ratio of 1.2:1



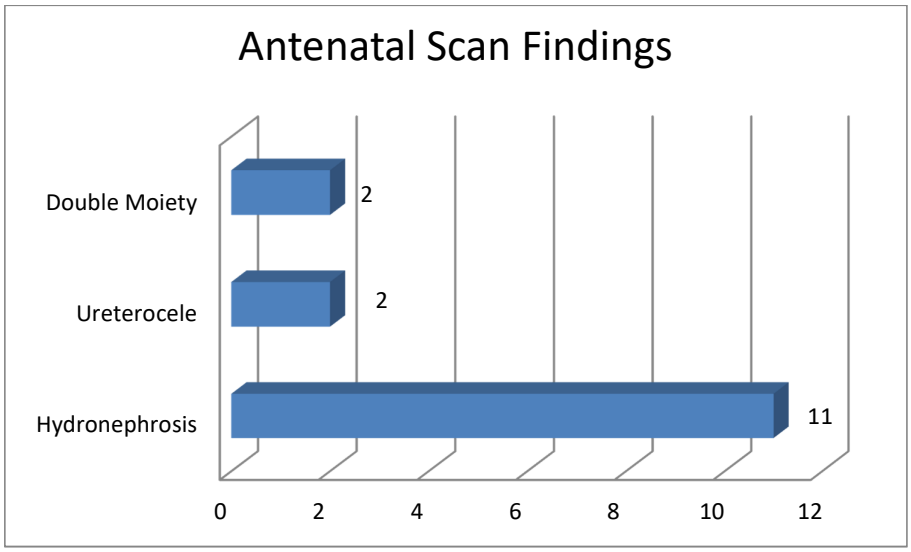
Antenatal Diagnosis:

15 patients (37.5%) were diagnosed on prenatal ultrasound screening.

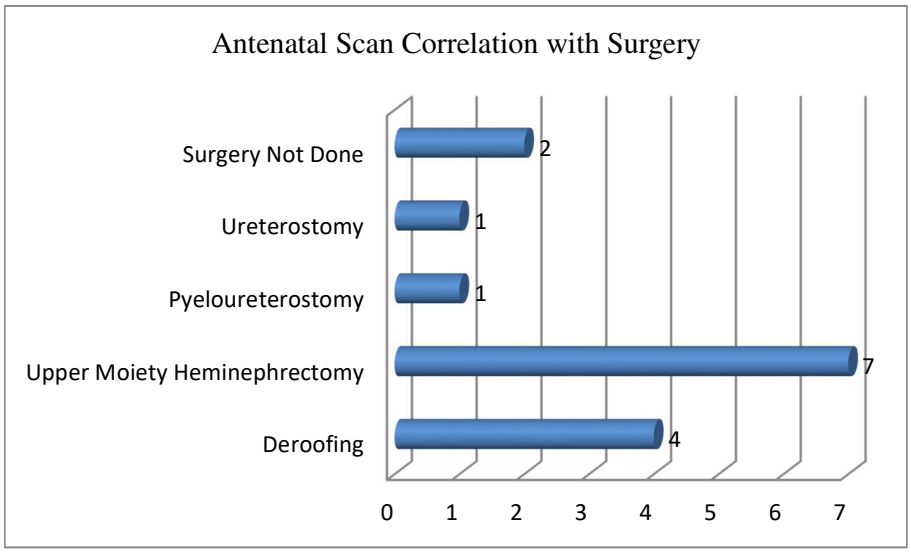
Antenatal Scan	N = 40
Diagnosed	15
Not Diagnosed	25



Out of the 15 cases, 11 were diagnosed as hydronephrosis, 2 were identified as double moiety and 2 were reported as ureterocele.

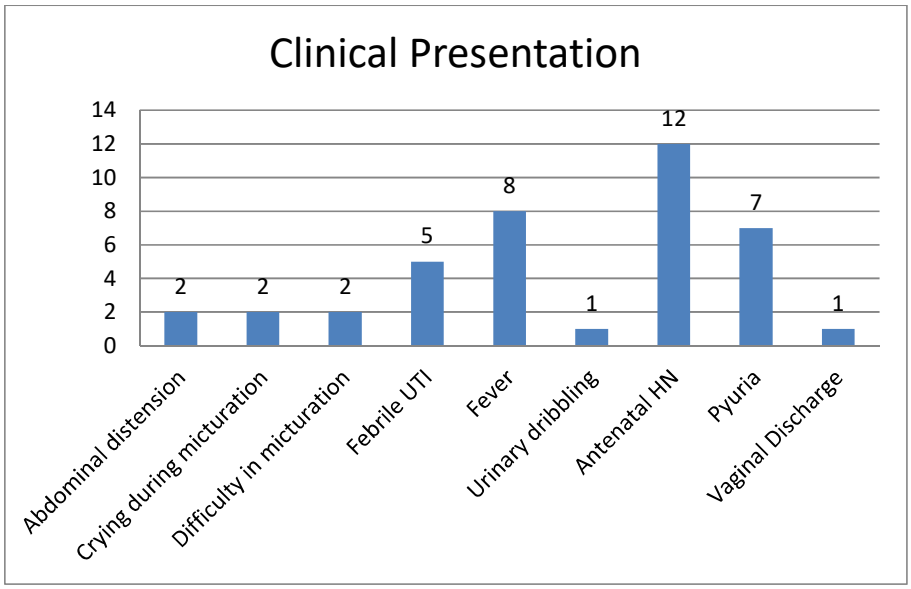


On following up these 15 patients, 13 were operated. The most common surgery performed being upper moiety heminephrectomy. The details of other surgeries are as follows.



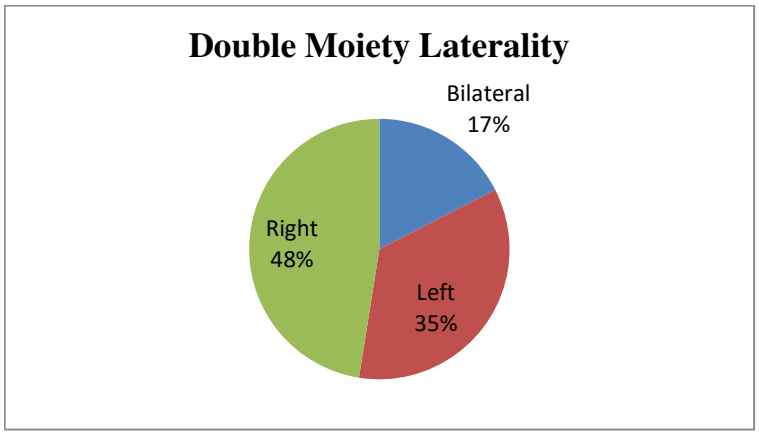
Clinical presentation:

The most common clinical presentation in symptomatic patients were fever with urinary tract infection.



Double moiety Laterality:

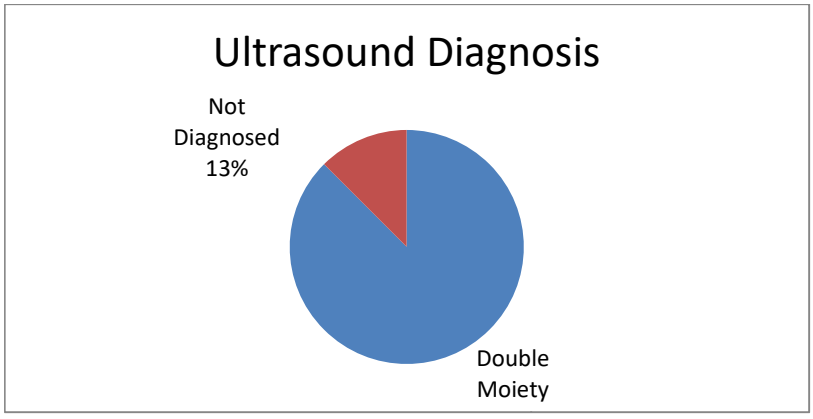
Unilateral presentations were more common with right sided predominance.



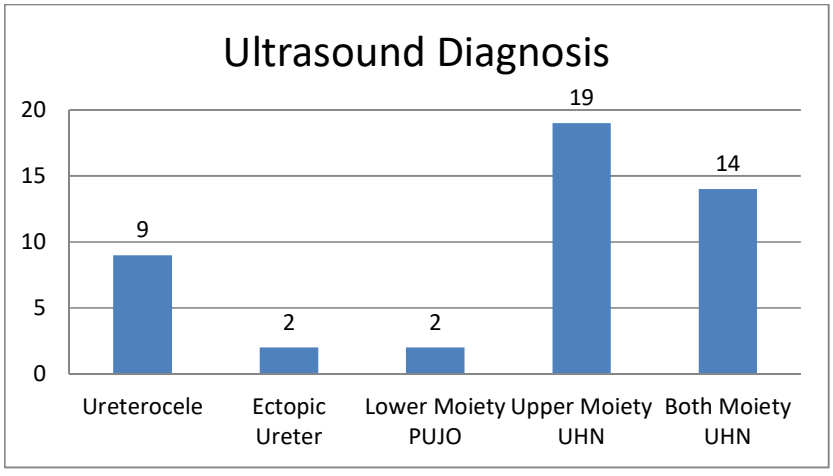
Imaging investigation:

Ultrasound Abdomen:

Ultrasound Abdomen was very sensitive in diagnosing duplex system with a sensitivity of 87%.

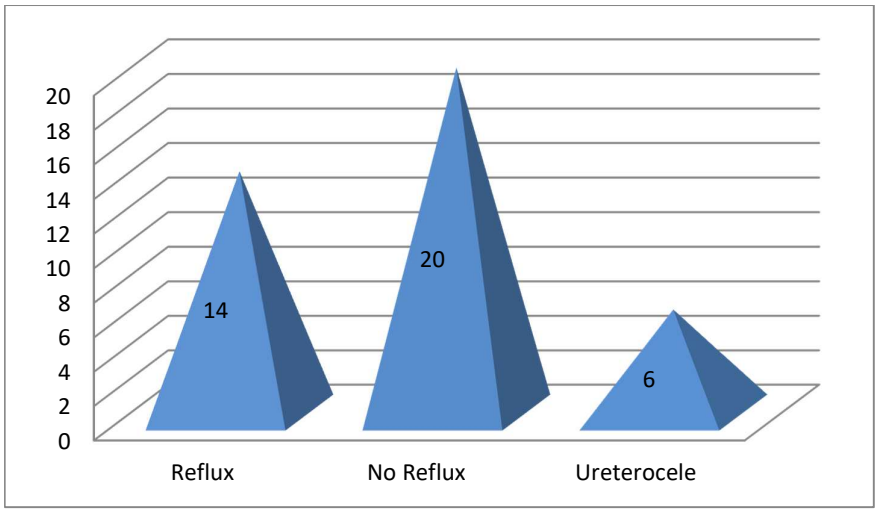


Ultrasound was able to recognise hydronephrosis of the duplex system precisely in most of the cases.



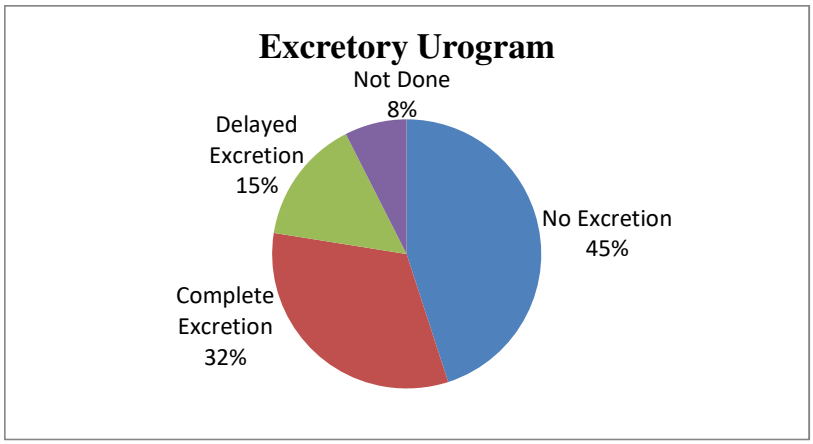
Voiding cystourethrogram (VCUG):

VCUG demonstrated reflux in 35% (14 pts) of patients and ureterocele in 15%.



Intravenous Urogram:

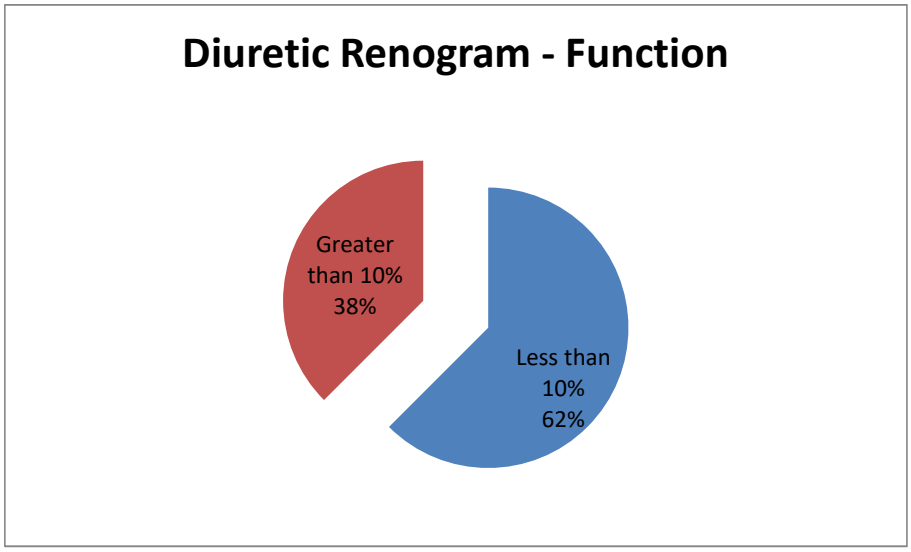
IVU was used to assess the functioning status of the moieties and the presence of ureterocele. It also demonstrated the status of opposite kidney.



Diuretic Renogram:

Diuretic Renogram was done in only 40% of patients to document the function of affected moiety. The incidence of non-functioning moiety (<10% function) was found to be 62%.

Diuretic Renogram	**N = 40**
Done	16
Not Done	24



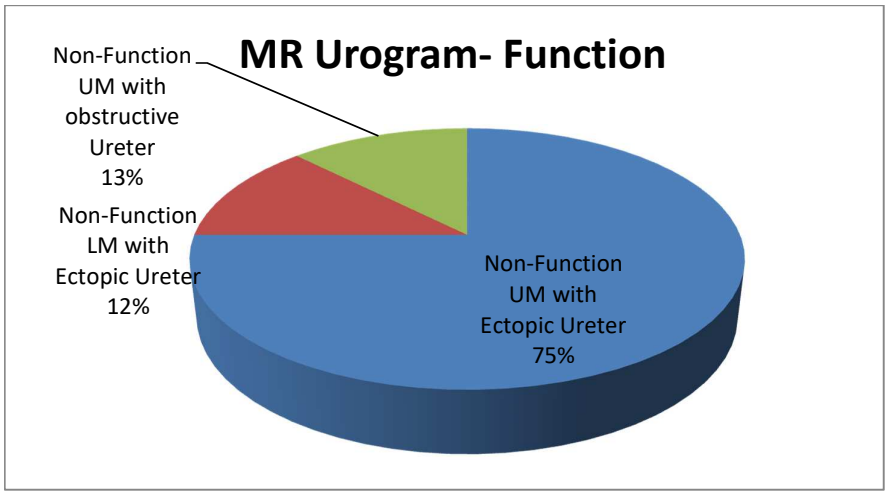
Magnetic Resonance Urogram (MRU):

MRU was performed selectively to delineate the anatomy in the most complex of cases.

MR Urogram	**Number**
Done	8
Not Done	32

MR Urogram- Function	N = 8
Non-Function UM with Ectopic Ureter	6
Non-Function LM with Ectopic Ureter	1
Non-Function UM with obstructive Ureter	1

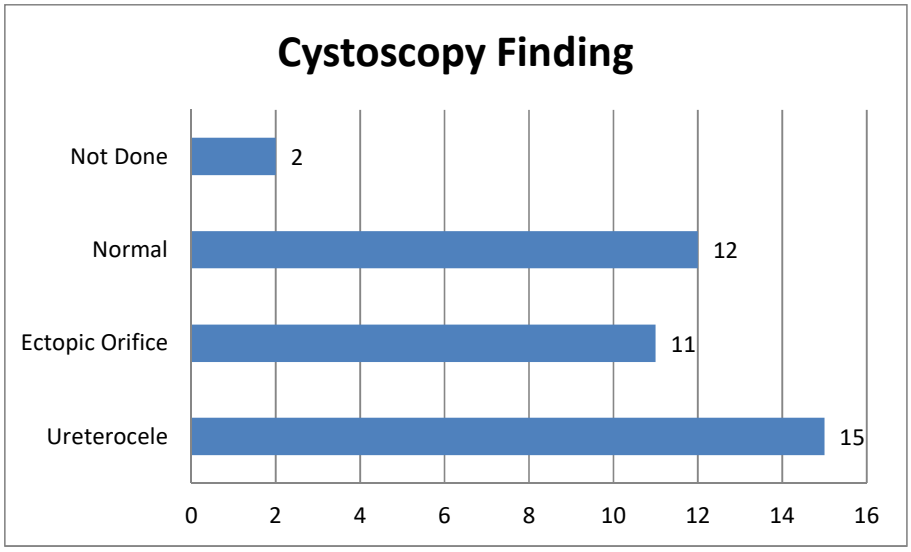
MRU was particularly useful in diagnosing ectopic ureter, better than Ultrasound or Intravenus urogram.

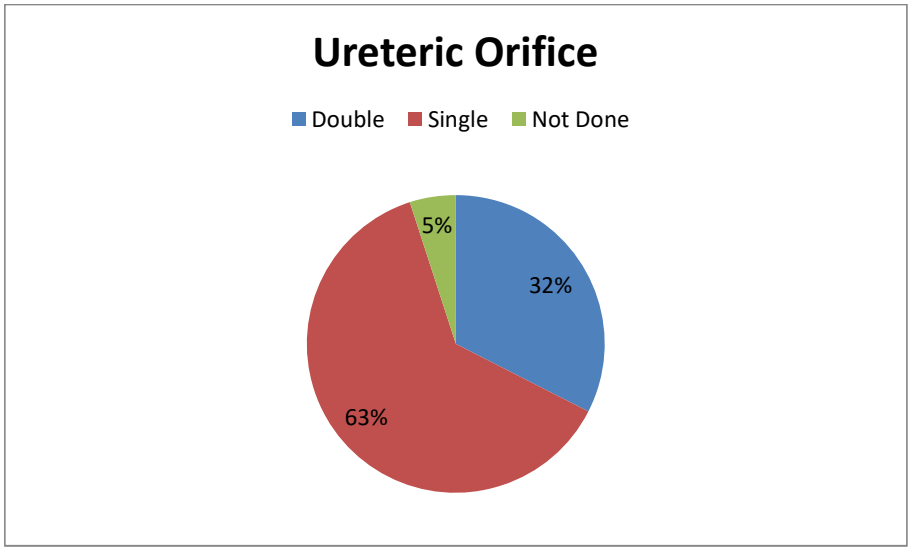


Cystoscopy:

A diagnostic cystoscopy was done in 95% of patients in our study. Cystoscopy was more sensitive in diagnosing ureterocele.

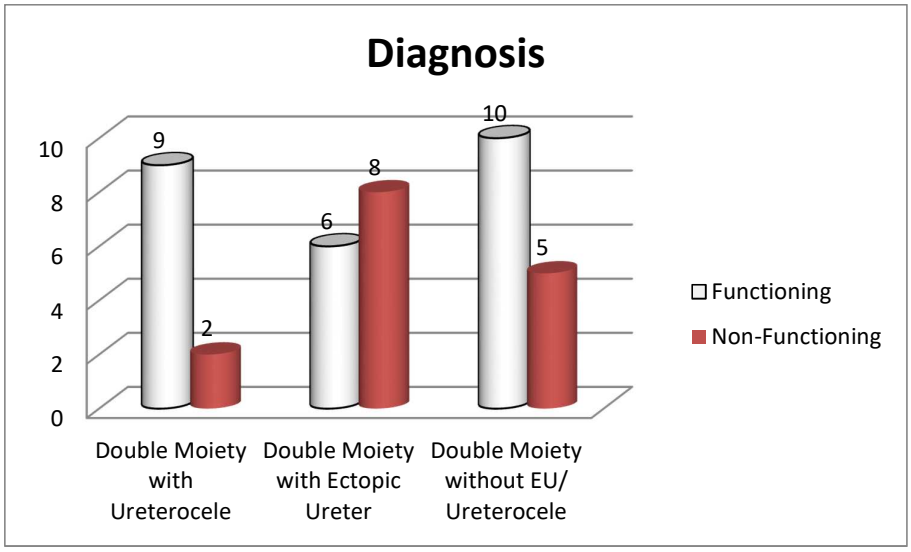
The findings are summarised in the following charts.





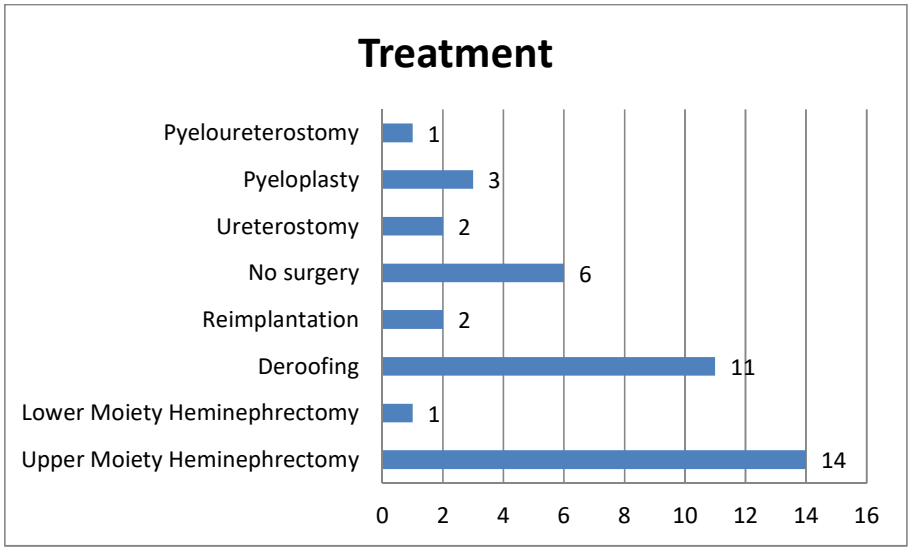
Diagnosis:

Diagnosis	Functioning	Non-Functioning	Total
Double moiety with ureterocele	9	2	11
Double moiety with ectopic ureter	6	8	14
Double moiety without ureterocele or ectopic ureter	10	5	15

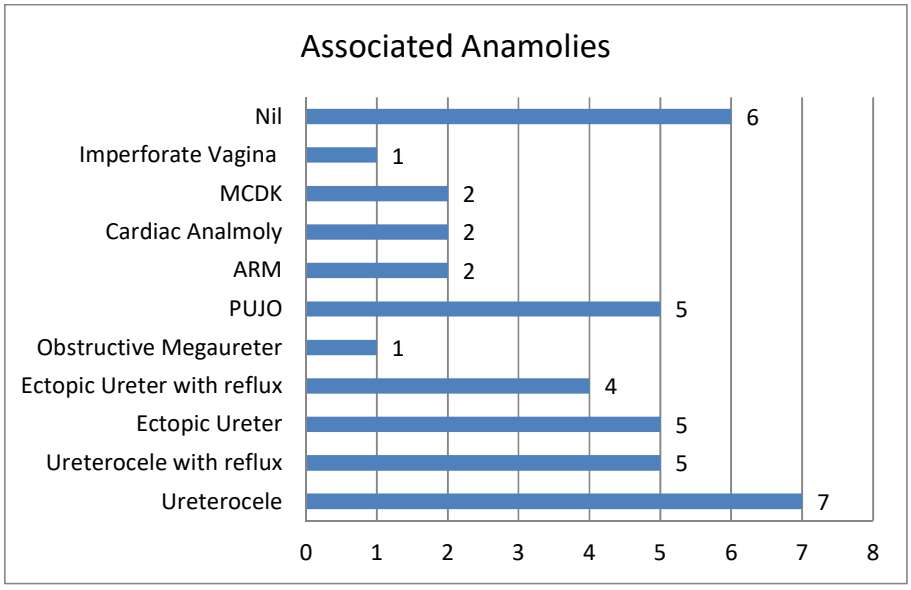


Treatment:

The most common surgery advocated was upper moiety heminephrectomy in 35 % of patients. Endoscopic Deroofing of ureterocele was done in 27.5%.

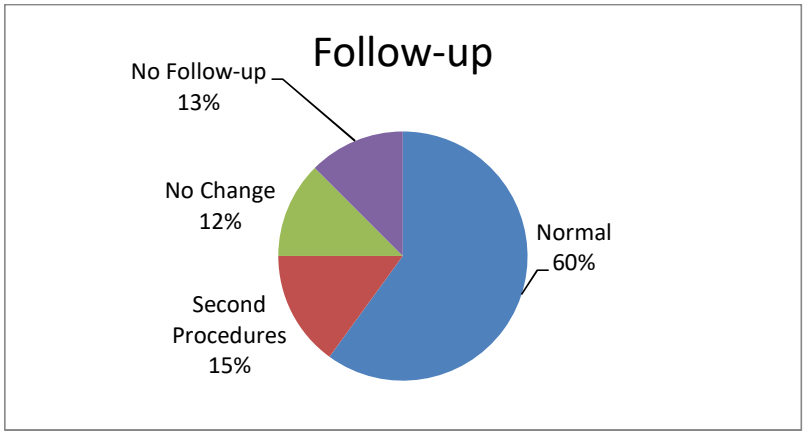


Associated anomalies:



Follow up:

On follow up most of the patients who underwent non-functioning moiety heminephrectomy were symptomfree on follow up. Second surgery was required in patients who initially underwent Deroofing of ureterocele.



DISCUSSION

DISCUSSION

Renal duplication is one of the most common congenital anomaly second only to cardiac anomaly with an incidence of 0.8% of general population.

E. Yoo et al retrospectively reviewed 15 cases of complex duplex system complicated with ureterocele. [27] D. Meneghesso et al examined the histology of 22 patients who underwent partial nephrectomy[28]. In our study we have prospectively evaluated 40 patients with duplex system.

Study	**no**
E yoo et al	15
D Meneghesso et al	22
our study	40

Boris chertin et al in a study of 52 patients with ureterocele found the incidence of antenatal diagnosed patients to be 23% against the symptomatic patients presenting after birth (40%).[29]

D meneghesso et al in their review of 22 patients had 16 (72.7%) of them diagnosed antenatally. In our study, out of the 40 patients 15 were diagnosed antenataly (37.5%).

Study	AN diag %
Boris chertin et al	23%
D Meneghesso et al	72.70%
our study	37.55

D Meneghesso et al reported a Male : female ratio of 1:2.7 whereas our study reported a ratio of 1:1.2 showing a similar female preponderance.

Privet et al in a large study found that unilateral duplication occur at a frequency of 83 % (equally common on each side) with bilateralism occurring in 17% of patients. [(30).]This is very similar in our study with the same 83% (33 patients) with unilateral duplex system. However we found a slight right sided preponderance in unilateral duplex system.

C Berger et al in a retrospective review of 161 patients reported a 60 % incidence of complete double moiety and 13% incidence of incomplete double moiety. [(31).]In our study the incidence of incomplete double moiety was 70% (28 patients) and complete duplication formed the remaining 30%.

M H Wang et al in a series of 30 patients treated for ectopic ureteroceles reported a single procedure in 27% of patients commonly

TUI, 2 procedure in 47% TUI + heminephrectomy and three procedures in 10% of patients. Lee PH et al in a study of 105 patients with Duplex reflux reported surgical management in 64% of patients with Ablative procedure in two third of them and common sheath reimplantation in one third of them.

In our study Deroofing (TUI) was done in 9 cases (22.5%). Double moiety with reflux was found in 11 patients (27.5%) of which 8 underwent Heminephrectomy and 3 underwent deroofing and subsequently progressed and ended up in heminephrectomy.

Prasant Jain et al from KEM hospital, Mumbai reported a rare case of UPJ obstruction of both upper and lower moieties in a duplex system.[(32).] Horst et al reported their experience of 11 children with UPJ obstruction in Duplex kidney. 8 of them underwent pyeloplasty, 2 heminephrectomy and one pyeloureterostomy.

In our study UPJ obstruction of lower moiety was found in 5 patients (12.5%). All 5 of them were associated with incomplete duplication. 3 of them underwent pyeloplasty, 1 pyeloureterostomy and 1 underwent heminephrectomy.

Surgery for UPJO in Duplex	Horst et al	Our study
Pyeloplasty	8	3
Hemi-nephrectomy	2	1
pyeloureterostomy	1	1

J Seibold et al in a series of cases of Laparoscopic heminephrectomy reported a longer operating time and concluded that Laparascopic hemi-nephrectomy is a technically demanding procedure. M Olguner et al reported Laparoscopic ureteroureterostomy in children with Duplex collecting system plus obstructed ureteral ectopia. All the Hemi-nephrectomies in our study were done by open method only.

CONCLUSION

CONCLUSION:

- Renal duplications are one of the common congenital anomalies affecting children
- Renal duplications are slightly more common in female children.
- Renal duplications are mostly asymptomatic, nowadays frequently identified in prenatal screening ultrasound
- Symptomatic patients more commonly present in infancy
- Ultrasound is very sensitive screening investigation in diagnosing duplex anomalies
- Intravenous urogram is an excellent tool in delineating the anatomy of functioning moiety
- Magnetic resonance urogram is very sensitive in delineating the anatomy of the non-functioning moiety and identifying ectopic ureter.
- Diuretic renogram is helpful in assessing the functional status of the moieties and planning the treatment.
- Cystoscopy is very sensitive in diagnosing ureterocele and deroofing is the most common initial surgery for ureterocele

- Upper moiety heminephrectomy is the most commonly performed surgery for symptomatic non-functioning duplex anomalies.

Pictures:


WL 6913 WW 9785
2/7 - []
GURUVISHVAN [M][001Yyrs]
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ICH EGMORE
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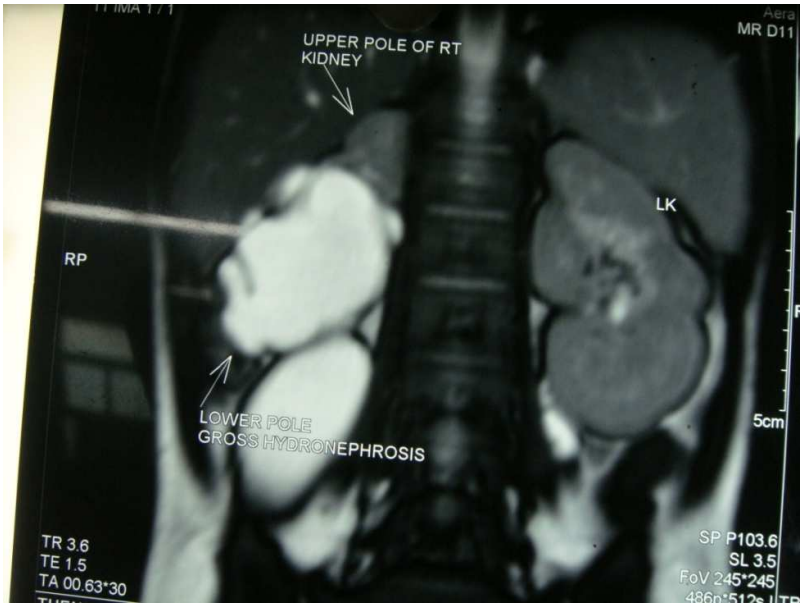
UPPER POLE OF RT KIDNEY
LK
RP
LOWER POLE
GROSS HYDRONEPHROSIS
5cm
TR 3.6
TE 1.5
TA 00.63*30
SP P103.6
SL 3.5
FoV 245*245


HAL
DIVYA 1/F
1061
*12-Mar-12, F, 12M
STUDY 1
12-Mar-13
8:16:46 PM
106 IMA 1 / 1
Cor>Tra -9
>Sag 3
RA
UB
MF 1.16
TR 3366.6
TE 697.0
BW 500.0
MIP THIN/M/DIS2D
A2/PFP/FS
*spcR3d1_270 / 140
A


Patient Name: THENARASU .S . Baby . 3.5 Yrs .
Patient ID: 3404-2012
Study Name: Renal Cortical Imaging- DMSA-Tc-99m
Study Date: 20/08/2012
Institution Name: Madras Medical Mission, Nuclear Medicine. Chennai 37 , Ph-044-26565904,.
ANT
RPO
LPO
Lt Posterior Rt
Lt POST Rt

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APPENDIX

INFORMED CONSENT FORM

Title of the study: "A study on clinical profile and outcome of Renal Duplication in Children".

Name of the Participant:

Name of the Institution: Dept. Of Paediatric surgery

Madras Medical College

Institute of Child Health, Chennai**.**

Name and address of the sponsor / agency (ies) (if any): None

Documentation of the informed consent

I _____ have read the information in this form (or it has been read to me). I was free to ask any questions and they have been answered. I am over 18 years of age and, exercising my free power of choice, hereby give my consent for my child to be included as a participant in **"A study on clinical profile and outcome of Renal Duplication in Children".**

I have read and understood this consent form and the information provided to me.

I have had the consent document explained to me.

I have been explained about the nature of the study.

I have been explained about my rights and responsibilities by the investigator.

I have been advised about the risks associated with my participation in this study.

I agree to cooperate with the investigator.

I am aware of the fact that I can opt out of the study at any time without having to give any reason and this will not affect my future treatment in this hospital.

I am also aware that the investigator may terminate my participation in the study at any time, for any reason, without my consent.

I hereby give permission to the investigators to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Govt. agencies, and IEC. I understand that they are publicly presented.

I have understood that my identity will be kept confidential if my data are publicly presented.

I have had my questions answered to my satisfaction.

I have decided to be in the research study.

I am aware that if I have any question during this study, I should contact the investigator. By signing this consent form I attest that the information given in this document has been clearly explained to me

and understood by me, I will be given a copy of this consent document.

Name and signature / thumb impression of the participant (or legal representative if participant incompetent)

Name _____ Signature_____

Date_____

Name and Signature of impartial witness (required for illiterate patients):

Name _____ Signature_____

Date_____

Address and contact number of the impartial witness:

Name and Signature of the investigator or his representative obtaining consent:

Name _____ Signature_____

Date_____

Renal Duplication – Proforma

Name:	Age:	sex:
Ip no:	ward:	unit:

Address:

DOA:	DOS:	DOD:

Presenting complaints:

AN Scan:

Ultrasound abdomen:

MCU:

IVU:

Diuretic renogram:

MRU:

Cystoscopy:

Diagnosis:

Surgery:

Associated anomaly:

Follow up:

Readmission:

S.No	Name	Age/Sex	IPNO	AN scan	clinical presentation	USG	MCU	IVU	Scopy	Renogram	MRU	Diagnosis	Anomaly	Treatment
1	Navsathbanu	3/12 F	731576	Lt. UHN	antenatal HN	LT DM /BOTH MOIETY UHN /URETEROCELE	LT REFLUX		Ureterocele	Lt obstructive curve		Lt Double Moiety/ureterocele/ upper moiety Non Functioning	Lt Reflex / Ureterocele	Deroofing
2	B/O Vijayalakshmi	3/12 M	732546	RT.UHN	antenatal HN	RT DM/ UPPER MOIETY UHN	No Reflux	Rt.RIM Sign	Rt side 2ureteric orifice/onenormal/another ectopic orifice near bladderneck	notdone	Rt Double Moiety Complete	Rt Double moiety /Upper moiety Non Functioning	Ectopic ureter	RT UPPER MOIETY HEMINEPHRECTOMY
3	Santhoshkumar	2yrs/M	729435	not detected	Fever	LT DM / UPPER MOIETY UHN	No Reflux		Ltside 2ureteric orifice/one normal/another ectopic orifice near bladderneck	L44%/uppermoiety2%/lowermoiety98%	not done	Lt Double moiety /Upper Moiety Non Functioning	Ectopic ureter	LT UPPER MOIETY HEMINEPHRECTOMY
4	Monisha	3yr/F	707430	not detected	Abdominal distension	RT DM/ UPPER MOIETY UHN	No Reflux	Upper Moiety non Functioning / lower Moiety delayed excretion	Both ureteric orifice normal		Rt Double Moiety / Upper Moiety Hydronephrosis	Rt upper Moiety Non Functioning	Obstructive MegaUreter	Rt Reimplatation
5	Guruvishvan	1yr/M	776410	not detected	Fever	RT DM/ UPPER MOIETY UHN/ URETEROCELE/LM PUJO	RT Ureterocele	Bothmoiety nonfunctioningl / ureterocele Lt side	Ureterocele	RK6%		Rt Double Moiety Non Functioning Bothmoiety/Ureterocele/LowermoietyPUJO	Ureterocele/Puj o	Deroofing
6	Reema gowsar	6/12 M	705214	Rt. UHN / Ureterocele	antenatal HN	RT DM/ UPPER MOIETY UHN	RT Ureterocele	Upper Moiety Non functioning	Ureterocele	notdone	not detected	Rt Double Moiety/UC/Upper Moiety Non Functioning	Ureterocele	Deroofing
7	Gokulalakshmi	2 1/2 F	716210	not detected	Pyuria	RT DM/ UPPER MOIETY UHN	No Reflux	Lt bifid- y-juct Rt - complete DM/Upper Moity Non functioning	Rtside2ureteric orifice/one orifice normal/Another Ectopic orifice nearBladderneck	notdone	RtUppermoietyHN / tortuous Ectopic ureter	B/L Double Moiety RT Upper Mioety Hydronephrosis/ Ectopic ureter	Ectopic ureter	RT UPPER MOIETY HEMINEPHRECTOMY
8	Swetha	4 yr F	696312	Lt. UHN	antenatal HN	Lt MCDK/ Rt UHN	No Reflux	Lt non-functioning/ Rt double moiety	Single orifice	notdone	not done	LtMCDK/RtDoubleMoiety Incomplete	Anterior perineal anus/ small VSD/LtMCDK	notdone
9	Poovarasi	9/12 F	717461	not detected	Crying during micturition	RT DM/ BOTH MOIETY UHN/ URETEROCELE	RT REFLUX	Rt Double Moiety with Ureterocele	ureterocele/	notdone	not done	RtDoublemoiety/ureterocele /LowermoietyVUR	Ureterocele/VU R	Deroofing
10	Dharshan	6/12 M	753944	not detected	Fever	B/L UHN	No Reflux	B/L UHN/ Single Moiety/ B/L Ureterocele	B/Lureterocele	RK48%/Lk52%	not done	B/L Ureterocele Single Moiety/ B/L UHN	Ureterocele	Deroofing
11	Santhosh	3 yr M	754612	not detected	Fever	Lt bifid pelvis Lt Ureterocele Lt UHN	No Reflux	LtBifid pelvis/ureterocele	ureterocele/single ureteric orifice	notdone	not done	Lt Ureterocele /Incomplete Duplication	Ureterocele	Deroofing
12	Chandru	1 yr M	683413	not detected	Pyuria	Rt DM / both Moiety UHN	B/L REFLUX	B/L prompt Excretion	2ureteric orifice seen Rtside/one normal/one ectopic orifice near bladder neck	notdone	not done	RtDoublemoietycomplete duplication/B/LVUR	B/L VUR	Rt Ureterostomy
13	Thennarasu	3 1/2 M	761234	not detected	UTI	B/L UHN	RT REFLUX	Rt Double Moiety /Rt VUR	Rt side 2UO/One Patulous/another normal.	notdone	UM Normal / LM gross HN /Tortuous Ureter wide Open VUJ	Rt DM lower Moiety Non functioning Lower Moity	RtVUR	Rt lower moiety Hemi Nephrectomy
14	Pavithra	3/12 F	645621	Lt. UHN	antenatal HN	Lt Ureterocele/ LT UHN	LT ureterocele	Lt Upper Moiety nonfunctioning	ureterocele	Lt Kidney 44%,UM no function	not done	Lt DM / UM Nonfunctioning/ Ureterocele	Ureterocele	LT UPPER MOIETY HEMINEPHRECTOMY

S.No	Name	Age/Sex	IPNO	AN scan	clinical presentation	USG	MCU	IVU	Scopy	Renogram	MRU	Diagnosis	Anomaly	Treatment	followup
15	Lingesh	4/12 M	722580	Rt DM UM UHN/ LM PUJO	antenatal HN	RT DM/ UPPER MOIETY UHN/ URETEROCELE/LM PUJO	RT ureterocele	B/L DM Rt ureterocele UM non functioning LM Hold up contrast	Ureterocele near bladder Neck	Rt kidney 31 % Obstructive pattern	not done	B/L Double Moiety Non Functioning Upper Mioety LM PUJO / RtUreterocele	ureterocele/LowermoietyPUJO	Rt UM heminephrectomy / Lower moiety Pyeloplasty	lower moiety normal
16	Abdul rahman	1/12 M	743437	B/L UHN	antenatal HN	RT DM	No Reflux	Rt DM/Incomplete duplication/lower moiety puio I16	normal	Rt Kidney 46 % Obstructive pattern	not done	Rt DM/ Incomplete duplication/ Rt Lower MoietyPUJO	Lower moiety PUJO	Rt Lower Moiety Pyelo ureterostomy	Bothmoiety normal
17	Ganesh	1 1/2 M	710718	notdetected	UTI	RT DM	No Reflux	Rt Doule Moiety Complete No Hydronephrosis	**Rt side 2ureteric orifice**	**notdone**	**not done**	**Rt DoubleMoiety complete**	nil	notdone	Bothmoiety normal
18	Pavithra	1 1/2 F	710421	notdetected	Pyuria	Lt D M / Upper Moiety UHN/ ectopic Ureter	LT REFLUX	Lt UHN upper Moiety Non functioning "Grouping milly sign"	Lt UM UO below bladder Neck J21	notdone	**Lt HUN /Ectopic Ureter**	Lt Double moiety upper Moiety nonfunctioning L VUR	Lt ectopic ureter	LT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal
19	Jeevitha	1 1/2 F	736073	LT DM UHN UM with Ureterocele	Difficulty in micturition	Lt D M / Upper Moiety UHN/ ectopic Ureter	LT REFLUX	B/L Double Moiety Rt Y juntion L3/ureterocele	Lt eptopic UC just above bladder neck	Lt Kidney 47 % UM:22 LM:78	**not done**	B/L Double Moiety/Incomplete duplication/ LT Upper moiety HN with GR V VUR/ Lt ectopic Ureterocele	LtVUR/ureterocele	LT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal
20	Divyadharshini	1 F	735896	Lt UHN	antenatal HN	Lt DM Upper Moiety UHN	LT REFLUX	Lt UM UHN with Ureterocele Prompt excretion both Moiety	Ltupper moiety ureterocele near bladderneck	Lt upper Moity 37 % Lower Moiety :73 %	not done	Lt Double moiety upper Moiety UHN with Ureterocele LT VUR	LtVUR/ureterocele	LT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal
21	Harish	7/12 M	714560	RT HUN	antenatal HN	Rt DM / Rt LM UHN	RT REFLUX	Rt Dm Non functioning UM	Rt Ureterocele up to Bladder Neck	Rt Kidney 49 % Upper Moiety non Functioning	not done	Rt Double Moiety with EctopicUreterocele/ GR III VUR	Ectopic ureterocele/VUR	Deroofing	Nonfunctioning upperh moiety/Rt heminephrectomy done
22	Dilip	1 M	778017	notdetected	Pyuria	RT DM / Ureterocele	RT Ureterocele	Lt bifid pelvis/ Rt non functioning/ large UreteroceleC	Rt Ureterocele near Bladder Neck	Lt 84 % / Rt 10 %	not done	RT double Moiety both moiety non functioning with ureterocele	Pulmonary valve stenosis	Deroofing	Nonfunctioning both moiety/Rt heminephrectomy done
23	Sabina	7 1/2 F	604034	not detected	UTI	Rt DM / both moiety UHN	No Reflux	Lt UHN with good excretion Rt UHN with faint excretion	B/Lureterocele/B/LVUR	Rt Kidney 25 % Lt Kidney 75 %/ Mulipla cold area both kidney	not done	B/L Duplex collected system B/L Ureterocele B/L VUR	B/L VUR/B/L ureterocele	RT UPPER MOIETY HEMINEPHRECTOMY	no change
24	Sivamaran	20 days / M	705459	RT UHN	antenatal HN	LT UHN	LT REFLUX	Rt UHN Non Drianing in six hours LT Double moietyno excretion	Single orifice	notdone	not done	LT Double MoietyIn Complete	nil	Lt high loop ureterostomy(Double Ureter)	same status
25	Sahana	5/12 F	778613	Lt UHN	antenatal HN	LT UHN	No Reflux	Lt Double moietr/upper moiety nonfunctioning	Single orifice	Lt kidney 55 % UM - 0.5 % LM 95% Rt kidney 45 No Focal leasions	not done	LT Doble Moiety non functioning Upper moiety	nil	LT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal
26	Ragavi Nethra	8/12 F	757391	Lt UHN	Abdominal distension	LT DM / BOTH MOIETY UHN	No Reflux	/LtDouyblemoiety/non functioning uppermoiety/Ectopic ureter	Eptopic Ureteric Orifice out side the bladder Neck	Rk24%,Lk76%	Ectopic Rtkidney nonfunctioning/Lt Doublemoiety with common channeljust above insertion into vagina	LT DM Complete Non functioning Upper Moiety Rt Pelvic kidney	Covered Anus incomplete with imperforate vegina	RT upper Moiety Hemi Nephrectomy LM End ureterostomy	Ureterostomy Retracted refashioning
27	Ayswarya	7/F	761489	not detected	Urinary dribbling	LT DM / BOTH MOIETY UHN	No Reflux	Lt Upper Moiety non functioning lower moiety drains in 4 Hour	Both ureteric orifice seen/Lower orifice outside bladderneck	notdone	not done	Lt Double moiety/complete duplication/ upper Moiety non functioning / Upper ectopic ureteric orifice into vagina	Ectopic ureter	LT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal
28	B/O Janaki	20 days / F	760237	not detected	Pyuria	Lt DM / Lt UHN/ Lt Ureterocele	No Reflux	Both kidney excretion noramal / ureterocele Lt side	Lt ureterocele	notdone	not done	Lt double Moiety / Lt UHN/ Lt Ureterocele	Ureterocele	Deroofing	normal

S.No	Name	Age/Sex	IPNO	AN scan	clinical presentation	USG	MCU	IVU	Scopy	Renogram	MRU	Diagnosis	Anomaly	Treatment	followup
29	Rekha pathima	16 days / F	691117	Rt UHN	antenatal HN	Rt DM / Both moiety UHN	RT Ureterocele	Rt Doublemoiety/rt ureterocele	Rt ureterocele	notdone	not done	Rt Double moiety incomplete Duplication / Both Moiety UHN Ureterocele	Ureterocele	Deroofing	same status
30	Sathishwari	3 1/2 / F	615387	not detected	UTI	B/L DM / BOTH MOIETY UHN	B/L REFLUX	B/L UHN/ Lt upper Moiety non functioning / Rt Upper delayed Functioning	Upper moiety ureteric Orifice distal to bladder neck	Lt kidney19%,Upper:.05, Lower:95/ Rt kidney 81 % Upper :19, lower:81	B/L UHN/ B/L UHN No Ureterocele	B/L Double Moiety / B/L VUR / Non functioning Lt Upper moiety / Poor functioning RT Upper Moiety	Lt ectopic ureter	LT UPPER MOIETY HEMINEPHRECTOMY	same status
31	Arshitha	3 F	731113	not detected	Fever	RT DM/ LT MCDK	RT REFLUX	Rt Double moiety Lt Kidney not visualised	B/L Para ureteric diverticulam	Lt Kidney no function / Rt kidney 95% Upper moiety :22, Lower moiety :78/ Lt kdsney 5 %	not done	Rt Double with VUR / B.L Para ureteric diverticulam / Lt MCDK	Lt MCDK	Lt Nephroureterectomy / B/L para ureterc diverticularectomy / Rt ureteric reimplantation	normal
32	Swetha	7 F	731843	not detected	UTI	LT DM BOTH MOIETY UHN	No Reflux	Lt Double moiety / Both moiety HN / Lower moiety PUJO	normal	notdone	not done	Lt Double Moiety both Moiety HN / Lower Moiety PUJO	Lower moiety PUJO	Lt Lower Moiety Pyeloplasty	
33	Juvuriya	2 F	752687	not detected	Fever	RT DM/UPPER MOIETY UHN	LT REFLUX	Rt Non functioning Upper Moiety Both kidney Drained completely at 6 hrs	Single orifice	notdone	not done	Rt Double moiety upper moiety non functioning / lt GR I VUR	Thalassemia Major	RT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal
34	Monisha	2 F	705919	not detected	Difficulty in micturition	LT DM/ URETEROCELE	No Reflux	Lt double moiety with ureterocele/ Both moiety Functioning	ureterocele	notdone	not done	Lt Double moiety/Incomplete duplication/ with Upper Moiety Ureterocele	Ureterocele	Deroofing	
35	B/O sathya	7 Days	724688	Rt hydro nephrosis		Rt Double moiety / Upper moiety Dialated	No Reflex					RT Double Moiety Upper Moiety Hydro Nephrosis			
36	B/O Sasikala	37 days M	745630	not detected	Crying during micturition	RT DM/ UPPER MOIETY UHN	No Reflux	Rt Double Moiety inComplete / Prompt excration / Lt PUJO	Single orifice	notdone	not done	RT DOUBLE MOIETY Incomplete Duplication /Lower moiety PUJO	Lower moiety PUJO	LT LOWER MOIETY PYELOPLASTY	normal
37	Srija	1 F	640083	not detected	Fever	RT DM/ LOWER MOIETY UHN	No Reflux	Rt Double Moiety / LT Bifid Pelvis	Single orifice	notdone	not done	Rt Double Moiety/Incomplete duplication / LT Bifid Pelvis	nil	notdone	normal
38	Thatchinamoorthi	5 M	762811	not detected	Fever	RT DM/ LOWER MOIETY UHN	No Reflux	Rt Double Moiety Complete / Prompt excration both Moiety	Rt side 2 ureteric orifice	notdone	not done	Rt Double Moiety Complete	nil	notdone	normal
39	Deepika	6/12 F	764665	notdetected	Pyuria	B/L DM RT Upper Moiety UHN	B/L REFLUX	Double moiety RT Kidney / Double Ureter joining L5S1 Level	Rt Ureteric orifice not visualized	notdone	not done	B/L Double moiety/Incomplete duplication RT Upper Moiety UHN with VUR Rt	RtVUR	notdone	same status
40	Divya	1 F	784827	not detected	Pyuria	Lt DM/BOTH MOIETY UHN/Upper moiety PUJO	No Reflux	Ldouble moiety/NonfunctioningUpperMoiety	Ltside 2ureteric orifice/one normal/another laterally placed		Lt HUN /Ectopic Ureter	LT Double moiety/Complete Duplication/Nonfunctioning Uppermoiety/Ectopic ureter	Lt ectopic ureter	LT UPPER MOIETY HEMINEPHRECTOMY	lower moiety normal